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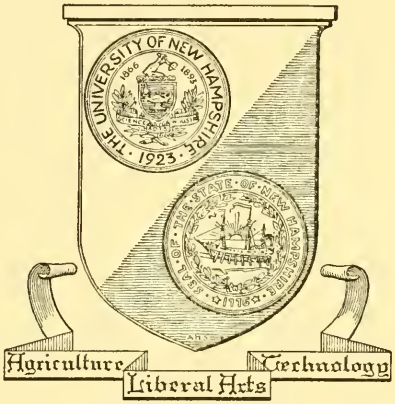

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THE MILKSHEDS OF NEW HAMPSHIRE

A Study of Their Characteristics and Relationships

By ALAN MacLEOD

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THE MILKSHEDS OF NEW HAMPSHIRE

A Study of Their Characteristics and Relationships[1] [2]

By ALAN MacLEOD, Assistant Economist in Marketing

To understand the working of economic forces in a particular market, a knowledge of the physical factors influencing the supply of milk and cream is necessary. This study attempts to supply such basic information regarding the dairy industry in New Hampshire.

State-wide maps showing location of producers and their markets have been prepared. For the markets operating under the State Milk Control Board, estimates of sales by type of distributors and other pertinent data are presented. This combination of graphic and tabular data gives detailed information regarding the milksheds of the State in a manner which should prove of value in the planning, conducting, and interpreting of future studies of milk marketing.

The Problem

Milksheds differ in their response to changing demand conditions. A small market, isolated geographically and economically from other markets and supplied with fluid milk and cream solely from near-by producers who have no alternate outlets of any consequence, can ignore to a considerable extent price fluctuations taking place in other markets. This is not true in the case of a small market situated in the center of the milkshed of a large market. With producers able to change from one market to another in response to price shifts, any conclusion regarding supply in the small market must take into account the effects of happenings in the large one.

Therefore, it is important not to confine a study of physical factors affecting the supply of milk and cream in a particular market to answering questions as to who produces the milk, where he lives, how far he lives from his market, how he gets his milk to town, and whether he distributes it himself or through a dealer's plant.

These tell only a part of the story. Two markets may secure their milk from about the same number of producers living about the same average distance from town with similar methods of bringing the milk to market and distributing it; yet to conclude that similar price or production policies will affect both markets in the same way and to the same extent may be widely in error. It is necessary also to consider the influences (both actual and potential) of *other* markets.

Some light upon the extent of such influence is thrown by maps showing size, location, and present market outlets of dairy farms in New Hampshire. Where, within a six-mile radius of a small market, a number of farms are now shipping to a large market (or markets), develop-

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(1) A "milkshed" is the area or region furnishing milk to a particular community.

(2) This is the first New Hampshire publication in the New England-wide milk marketing study, which is sponsored by the New England Research Council.

Acknowledgment is made to the State Milk Control Board, local boards of health, milk distributors, and others who supplied data for use in this study.

ments in the large market must have a much more direct effect upon supply in the small market than would be true, if only a few farms within such a radius were shipping outside.

Changing market relationships show their first effects in the areas where inter-market competition takes place. By focusing attention upon such areas the results of price shifts between markets may be discovered without wasted time or effort.

The application to other markets of conclusions regarding supply drawn from the study of a particular market, may be aided by the maps and tabular data reported in this study. Likewise, fundamental differences between markets are brought to light.

The Milksheds

(1) General

Maps have been drawn showing the location, size of herd, and market outlet of all commercial dairy farms in New Hampshire. In their preparation the following methods were used:

Town maps on a scale of two inches to the mile showing location and size of herd of each commercial farmer were available from a types-of-farming survey conducted by the Experiment Station in cooperation with the Agricultural Adjustment Administration in 1935. In making this survey, town maps showing roads and residences were copied from old Geological Survey maps. One or more selectmen (and in most cases several other key men) were visited in each town and asked to assist in the work. From the town inventory a list of farmers was prepared and checked against the names on the map. From the State Milk Control Board, local health officers, milk distributors and others, the destination of each farmer's milk was learned. County maps were prepared from these data and, after reducing the scale, a State map was drawn.

Supplementing these maps are data regarding sales in all intrastate markets in which the State Milk Control Board operated.

Technical difficulties prevent printed reproduction of any but a few relatively small markets. Hand-colored copies of the State map are available for reference at the Experiment Station, the U. S. Department of Agriculture, and the New England Research Council office in Boston. Large scale maps of most local markets are on file at the Experiment Station. To illustrate the information made available certain milksheds have been reproduced on a small scale in this study.

In the three maps shown here, the solid red circles represent producers selling to the market under consideration; the solid black circles, sales to other local markets; the circles with dots, no sale, and the plain circles, sales to small local markets. The green triangles represent producers selling to out-of-state markets. The symbol used refers to the market in which the milk is consumed. By varying the scale of the circles and triangles, differences in size of dairy enterprise are indicated.

The maps are not completely accurate. A farm may be shown on the wrong side of the road or even a short distance away from the road. These are not topographical maps. As only farms of three cows or more are shown, some small producers will not appear. Furthermore, this is a cross-section analysis and it had to be done over a period of time. Shifts of producers in and out of production, of producers from one market (or dealer) to another, and of cow numbers are constantly taking place.

A completely accurate picture of milksheds throughout the State could only be obtained by an instantaneous exposure. Instead of that, a succession of pictures was taken and joined together to make the whole. The inaccuracies inevitably introduced by such a procedure are probably not sufficient to affect the value of the maps for the purposes for which they are intended.

For 35 markets in which the Control Board operated, over 98 per cent of the production is accounted for, and no single market shows less than 95 per cent located. Judging from markets where 100 per cent of production has been found, no significant change in the picture is introduced when less than five per cent of production is missing.

Maps are reproduced in this study of the Claremont, Keene, and Laconia milksheds, and they have been chosen to illustrate the differences and similarities which occur between markets of about the same size. Claremont (population 12,377) is situated in, and Keene (population 13,794) is close to, the wholesale dairy section of the Connecticut River Valley. Laconia (population 12,471) is in the summer resort section.

(2) Total Sales in Various Markets

In this study, the term "dealer" is applied to a distributor who purchases the major portion of the milk he sells. The term "producer-distributor" is applied to a distributor who produces the major portion of the milk he sells.

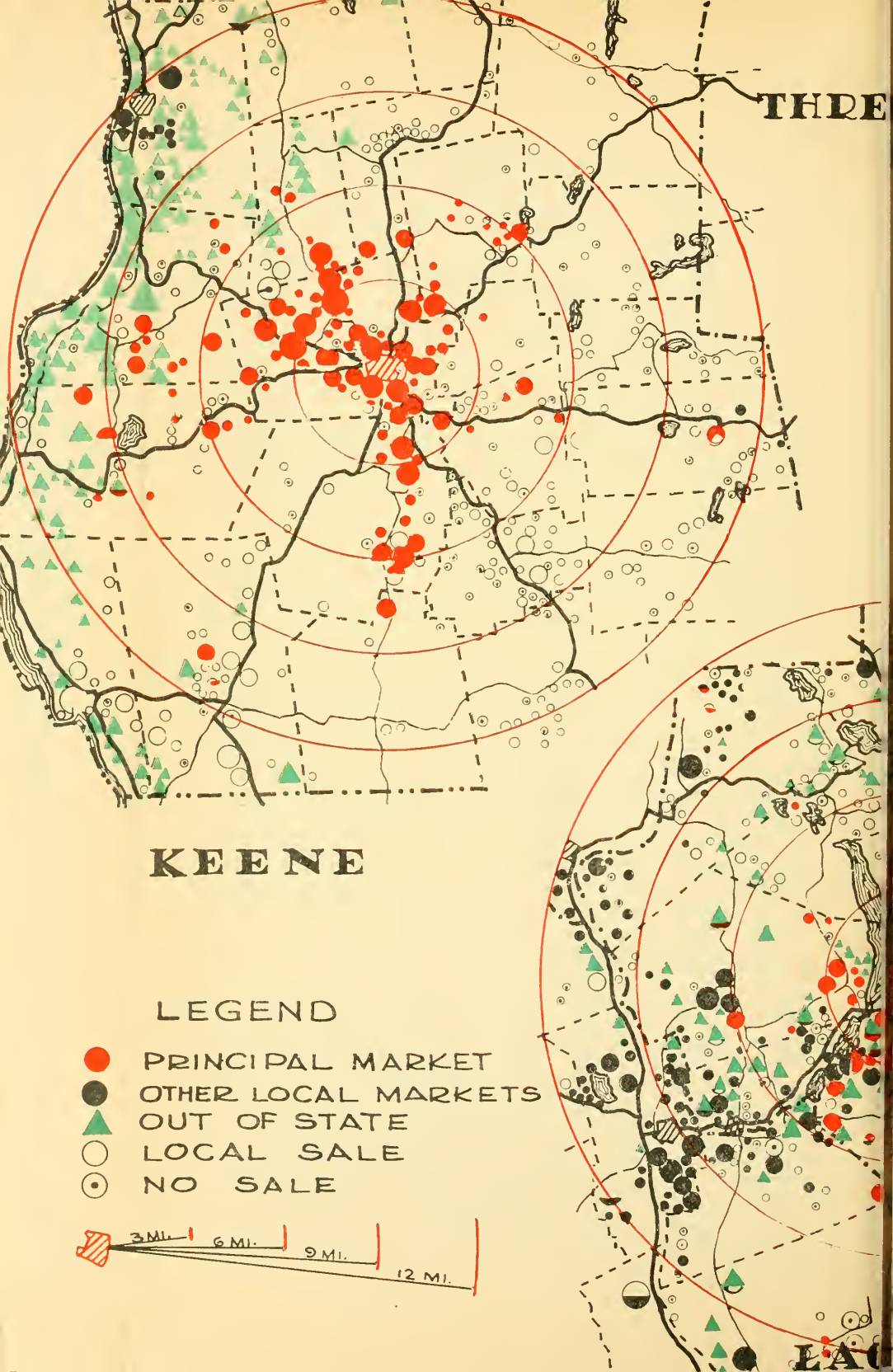
Estimated daily sales of milk and cream (on milk equivalent basis) by dealers, producer-distributors, and stores in all 35 markets are shown in Table I. These estimates have been made from Control Board records of distributors' average daily sales in the year immediately preceding the summer of 1936. These data, in most cases, are producers' estimates and are not taken from actual sales records. All of the cities and most of the large towns are included in this table.

The amounts listed under the column "Total" represent estimates of net daily sales in each market. Estimates of dealers' and producer-distributors' sales are given separately. Items under "Stores" are not included in the estimates of net sales, as double counting would be introduced. Milk or cream sold by a store has already appeared in dealers' or producer-distributors' sales.

(3) Importance of Different Types of Distributive Agencies

Total daily sales of milk and cream in New Hampshire markets operating under the State Milk Control Board varied from over 30,000 quarts to less than 200 quarts. In the three markets whose maps are reproduced here, Claremont, Keene, and Laconia, sales varied between five and seven thousand quarts.

But estimates of total sales conceal many significant market differences. Some markets (and this is true of the two largest state markets) receive most of their milk from dealers. In such markets, producer-distributors play only minor roles; and producers, therefore, have little direct contact with the problems of retail distribution. Markets of this type include Manchester, Nashua, and Portsmouth. Table I shows that in each of these markets, well over 90 per cent of the milk was distributed by dealers.


THRE
KEENE
LEGEND
PRINCIPAL MARKET
OTHER LOCAL MARKETS
OUT OF STATE
LOCAL SALE
NO SALE
3 MI.
6 MI.
9 MI.
12 MI.

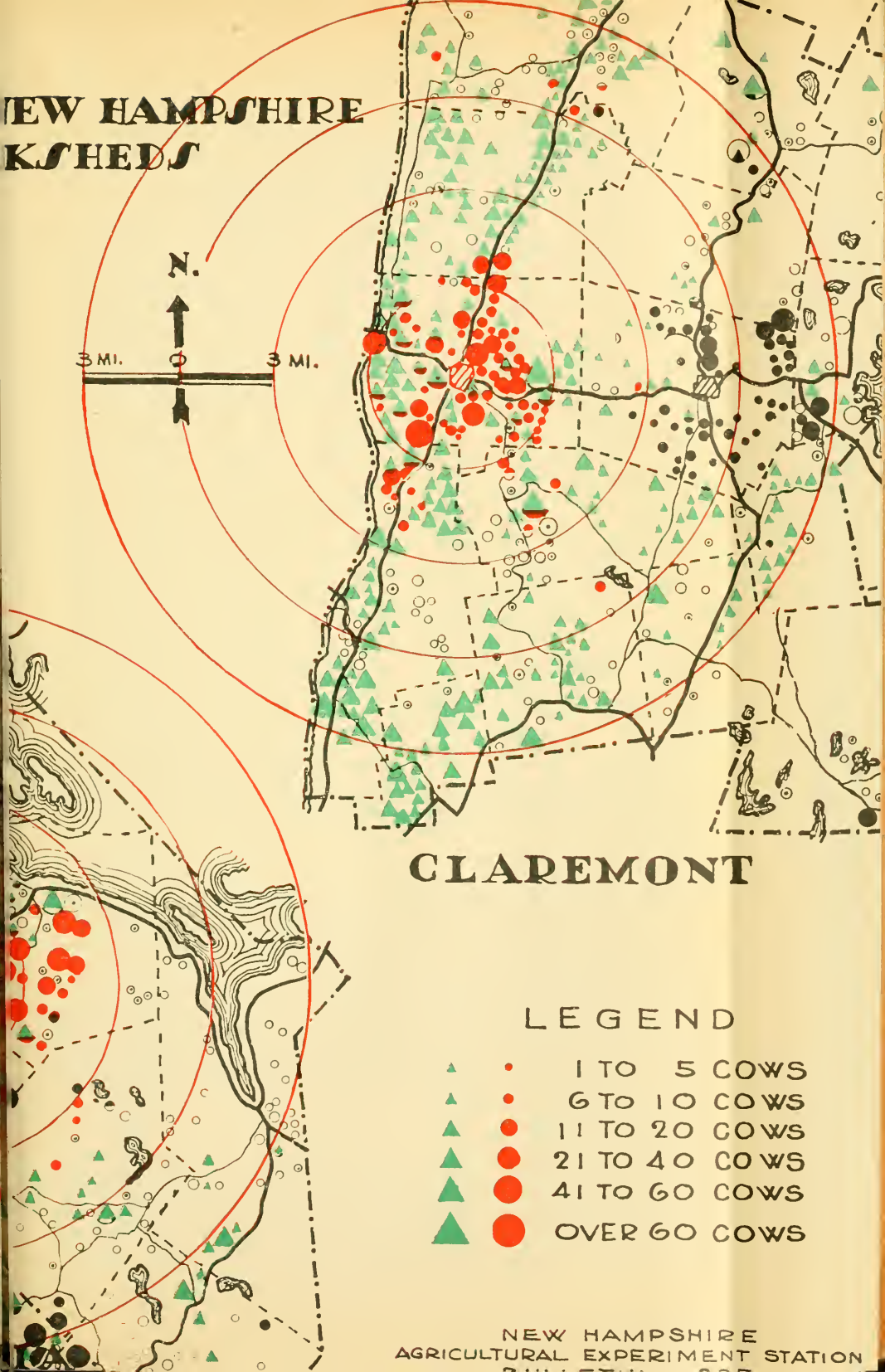

EW HAMPSHIRE
KSHEDS
N.
3 MI.
3 MI.
CLAREMONT
LEGEND
1 TO 5 COWS
6 TO 10 COWS
11 TO 20 COWS
21 TO 40 COWS
41 TO 60 COWS
OVER 60 COWS
NEW HAMPSHIRE
AGRICULTURAL EXPERIMENT STATION

Table I. Daily Distribution of Milk and Cream[1] in New Hampshire Markets (1935-1936)

City or Town[2]	Milk and Cream Distribution							
	Total		Dealers		Producer-Distributors		Stores[3]	
	No.	Quarts	No.	Quarts	No.	Quarts	No.	Quarts
Manchester	42	33,515	26	32,175	16	1,340	318	6,793
Nashua	30	15,805	20	15,215	10	590	158	4,024
Concord	79	13,143	7	7,410	72	5,733	95	2,964
Berlin	47	7,174	16	4,554	31	2,620	74	1,871
Portsmouth	18	7,727	3	7,050	15	677	68	2,788
Keene	66	6,421	9	3,180	57	3,241	43	1,518
Dover	78	6,186	5	1,948	73	4,238	55	1,278
Laconia	70	7,006	6	2,795	64	4,211	60	1,452
Claremont	89	5,117	4	675	85	4,442	37	962
Rochester	77	4,199	3	383	74	3,816	56	1,029
Lebanon	23	2,226	3	770	20	1,456	15	361
Franklin	46	2,798	..	....	46	2,798	20	508
Somersworth	30	1,647	3	209	27	1,438	18	352
Exeter	31	3,622	1	245	30	3,377	18	420
Newport	51	2,590	1	422	50	2,168	16	349
Littleton	32	2,099	2	535	30	1,564	17	438
Suncook	25	1,393	2	417	23	976	8	202
Hanover[4]	18	3,498	1	810	17	2,688	7	227
Lancaster	22	1,383	..	....	22	1,383	10	284
Gorham	14	1,047	1	200	13	847	6	135
Farmington	40	1,159	1	46	39	1,113	12	329
Hampton and Rye Beach[5]	13	8,929	5	5,525	8	3,404	23	1,035
Newmarket	30	1,131	..	....	30	1,131	4	124
Northumberland	17	927	..	....	17	927	9	136
Lisbon	20	976	..	....	20	976	4	68
Walpole	10	666	1	250	9	416	7	377
Colebrook	16	710	1	20	15	690	5	55
Whitefield	24	802	2	70	22	732	8	298
Bristol	25	1,058	4	301	21	757	15	317
Newington, Stratham and Greenland	11	231	1	112	10	119	..	....
Belmont	6	287	2	168	4	119	6	187
Henniker	12	528	..	....	12	528	4	93
Stewartstown	4	170	..	....	4	170	3	50
North Stratford	2	165	..	....	2	165	1	34
Bethlehem[6]	18	1,837	3	970	15	867	4	94

[1] Cream expressed as milk equivalent.
[2] Roughly in order of population, 1930 Census. Non-coincidence of Control Board areas with census divisions makes exact ranking impossible.
[3] Not included in Total.
[4] College town.
[5] Summer only.
[6] Resort town.

Markets dominated by neither dealers nor producer-distributors include Concord, Keene, and Laconia. And markets served largely by producer-distributors include Claremont, Rochester, and most of the smaller communities.

Table I shows the wide variation in number of dealers and producer-distributors from market to market. Store sales are included to make the picture complete. In the larger cities, the number of stores handling milk may greatly exceed the number of other distributive agencies. This situation is reversed in the smaller markets, where producer-distributors ordinarily outnumber stores.

(4) Extent of Milksheds

Milksheds differ in extent. Production densities being equal, the larger the market the farther must it reach out in order to satisfy its requirements. Where, as is frequently the case, production densities also vary, another factor must be considered. The Keene and Berlin markets illustrate strikingly the effect of different production densities

'able II. Approximate Numbers of Cows on Farms Supplying Local Markets from Various Distances Together with Comparative Numbers of Cows Supplying "Other Large Markets"

Milkshed	Destination of Milk	Distance from Local Market					
		Within 3 miles	3 to 6 miles	6 to 9 miles	9 to 12 miles	Over 12 miles	Out-of-State
ıchester	Local	231	668	503	408	2,217	..
	Other	...	...	129	507		
hua	Local	222	587	289	142	865	10
	Other	16	476	817	1,000		
cord	Local	300	713	445	152	33	..
	Other	15	...	272	597		
in	Local	133	159	247	75	122	250
	Other	...	...	...	...		
:smouth	Local	430	335	40	10	10	10
	Other	119	185	652	Many		
ne	Local	508	322	172	30	10	..
	Other	...	...	190	Many		
er	Local	608	140	71	7	...	60
	Other	40	114	Many	Many		
ɔnia	Local	324	363	46	11	40	..
	Other	81	189	235	Many		
'emont	Local	510	158	...	...	...	..
	Other	246	477	Many	Many		
hester	Local	400	100	50	...	36	40
	Other	...	154	Many	Many		
anon	Local	374	59	...	...	...	5
	Other	347	Many	Many	Many		
nklin	Local	253	90	3	...	...	..
	Other	42	283	Many	Many		
ersworth	Local	494	...	...	...	...	135
	Other	205	Many	Many	Many		
ter	Local	122	179	9	...	...	..
	Other	335	Many	Many	Many		
'port	Local	231	75	22	...	...	..
	Other	31	278	Many	Many		
leton	Local	284	20	...	...	...	10
	Other	262	642	Many	Many		
ıover	Local	130	41	...	...	...	250
	Other	32	668	Many	Many		
caster	Local	90	54	...	...	...	..
	Other	723	Many	Many	Many		
cook	Local	138	57	...	...	...	..
	Other	102	Many	Many	Many		
ham	Local	80	15	...	...	25	2
	Other	2	61	Many	Many		
mington	Local	129	17	1	...	5	..
	Other	19	166	Many	Many		
vmarket	Local	123	28	...	...	...	..
	Other	211	916	Many	Many		
ɔon	Local	93	32	...	...	...	..
	Other	798	Many	Many	Many		
lpole	Local	83	15	5	...	...	5
	Other	401	Many	Many	...		
ebrook	Local	57	15	...	...	...	20
	Other	593	Many	Many	Many		
itefield	Local	70	28	...	...	...	5
	Other	285	671	Many	Many		
stol	Local	75	20	5	...	25	..
	Other	44	Many	Many	Many		
mont	Local	30	4	...	...	...	..
	Other	253	Many	Many	Many		
niker	Local	64	19	...	...	...	..
	Other	295	185	Many	Many		
wartstown	Local	2	12	...	...	...	6
	Other	651	Many	Many	Many		
th Stratford	Local	27	...	...	...	...	..
	Other	95	224	Many	Many		
hlehem	Local	109	15	8	...	...	220
	Other	87	225	Many	Many		
thumberland	Local	110	20	...	...	...	6
	Other	205	Many	Many	Many		

on the extent of the milkshed. Keene, situated in the center of a good dairy section, receives most of its milk from within nine miles of the center of town. Berlin, on the other hand, being located in a wooded mountainous section must go from 15 to 18 miles to get a part of its milk. And yet consumption in the two markets, as indicated by sales, does not differ greatly.

Maps show best the extent of milksheds. To assist the eye, circles with radii of three, six, nine, and twelve miles have been drawn around the centers of the various markets. To supplement, and to some extent to substitute for, the maps, a method of tabular presentation has been adopted. Within each three-mile radius marked off by the circles, the approximate numbers of cows on farms selling to the local market and to other large markets are indicated. In markets where comparisons have been made of daily sales of milk and of cow numbers, the two have been in rough agreement. The number of cows is also helpful in showing market inter-relationships.

Table II shows, for most of the market areas, the number of cows within each three-mile radius up to 12 miles from the market. Over 12 miles only three markets—Berlin, Manchester, and Nashua—get appreciable amounts of milk. Where purchases are made out-of-state, no attempt has been made to estimate the distances from which the milk comes. The cow numbers estimated in each area under "Other Large Markets" represent estimates of cows on farms shipping to markets other than that under consideration.

(5) Relationship of Markets to One Another

Well over half of the milk produced in New Hampshire is consumed within the State. Table III, which includes only farms with three or more cows, shows the number of cows in each county on farms shipping out-of-state and supplying local needs. Were one- and two-cow farms included, the estimates of the percentage of production consumed within the State would be even higher. Another factor which, if taken into consideration, would increase still further the percentage of local consumption is that, on farms reported shipping out-of-state, some milk is retained for home use. The data in Table III should be read with these two modifying factors in mind.

State and county estimates of the importance of out-of-state markets, while valuable for some purposes, do not show the influence of *other*

Table III. Approximate Number of Cows on Farms Shipping Out-of-State and Supplying Local Needs

County	Percentage of Cows Supplying Local Needs	Number of Cows on Farms Supplying Local Needs	Number of Cows on Farms Shipping Out-of-State	Total
Belknap	77	2,372	693	3,065
Carroll	90	2,202	237	2,439
Cheshire	60	3,033	2,020	5,053
Coos	28	2,616	6,611	9,227
Grafton	37	5,373	8,984	14,357
Hillsborough	72	5,638	2,203	7,841
Merrimack	83	5,993	1,270	7,263
Rockingham	52	3,759	3,439	7,198
Strafford	86	2,994	490	3,484
Sullivan	44	1,947	2,460	4,407
State	56	35,927	28,407	64,334[1]

[1] 82 per cent of 1935 Census. Does not include farms with very small herds.

markets upon a particular local market. In most of New Hampshire by "other markets" is meant the Boston market. This is largely true of the three milksheds reproduced in this study.

The Claremont, Keene, and Laconia milksheds appear similar as long as attention is focused upon the circles. But now, look at the triangles. Keene, though near the Connecticut Valley with its well developed wholesale milk business, is comparatively isolated. No milk goes to other large markets from within six miles of Keene and only a small amount from within a radius of nine miles. The Claremont milkshed, on the contrary, shows that within three miles farms shipping out of state have about half as many cows as those selling locally. In the three- to six-mile area the producers selling on the Boston market greatly outnumber those selling locally. Laconia, while not as isolated, economically, from the Boston market as Keene, is not as exposed as Claremont. Considerable milk from within six, and even three, miles of Laconia goes to other large markets.

Table II presents in tabular form similar material for 34 New Hampshire markets. In each milkshed the numbers of cows within certain distances whose milk is consumed in that market are compared with the numbers whose milk goes to other large markets. These comparisons are made for the areas marked off by concentric circles three miles apart.

In summary form, much the same sort of information can be obtained from use of this tabular material as is supplied by the maps. The comparison of the Claremont, Keene, and Laconia markets indicates the use of these data.

As stated earlier in the study, this factor of "other market" influence is one of great importance. There are few markets of any size in New Hampshire which are not influenced to some extent by conditions in the Boston market. Usual description of the Boston milkshed includes the whole of New Hampshire. Within the Boston milkshed are large secondary milk markets such as Manchester and Nashua, which in turn exert an influence upon smaller communities. How direct and how strong are these outside influences upon any particular market are pertinent questions and upon them this study should throw some light.

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